**4.3 The student will demonstrate an understanding of the properties, movements, and locations of objects in the solar system. (Earth Science)**

**Key Concepts:**
**Solar system**: Earth, planets, the Moon, the Sun
**Movements:** revolution, rotation, day-night, axis, year, seasons
**Moon:** phases of the Moon, tides
**Shadows**: change in length, position of Sun
**Tools:** telescopes

## Supporting Content Websites

What is the solar system? Storybook
http://www.nasa.gov/audience/forkids/home/F_Ames_What_is_the_Solar_System_Storybook.html
Interactive story book telling students what makes up the solar system.
4-3.1

Interactive Solar System Facts
http://www.apples4theteacher.com/starwarp2.html
Interactive solar system game. Students click on rockets to learn facts about the planets.
4-3.1 Note: More appropriate for teacher background information.

A Tour of the Solar System
http://www.seasky.org/solarsystem/sky3.html
Take a tour of the solar system from Mercury to Pluto. See actual photos taken from various spacecraft. Note: More appropriate for teacher background information.
4-3.1, 4-3.2

The Solar System
http://starchild.gsfc.nasa.gov/docs/StarChild/solar_system_level1/solar_system.html
Describes the solar system and everything found in it. Links to information on the moon and sun included.
4-3.1, 4-3.2, 4-3.3

Complete Sun and Moon Data for One Day
http://aa.usno.navy.mil/data/docs/RS_OneDay.html
Obtain the times of sunrise, sunset, moon rise, moon set and information on the moon's phases. Note: More appropriate for teacher background information.
4-3.5, 4-3.6

In Orbit Around the Sun
http://www.sofweb.vic.edu.au/Steps/students/3-4Years/earth/orbit.htm
Explanation of day and night given plus you can actually view a current shot of the earth showing where it is day and night at the present time. Note: More appropriate for teacher background information
4-3.5.

Moon Phase Calculator
http://stardate.org/nightsky/moon/
Provides the calendar for any month and what phase the moon will be at on a particular day. Note: More appropriate for teacher background information.
4-3.6

Windows to the Universe
http://www.windows.ucar.edu/windows.html
Covers any topic imaginable on space – space weather, solar system, moon, sun, and many more.
4-3.1, 4-3.2, 4-3.3, 4-4.3, 4-3.5

The Seasons
http://www.bbc.co.uk/science/space/solarsystem/earth/solsticescience.shtml
Explanation of the seasons and what causes them.
4-3.4

The Tides
http://oncampus.richmond.edu/academics/education/projects/webunits/cycles/tides.html
Explanation of high tide and low tide.
4-3.6

## Suggested Literature

Burnham, R. (2000). *Reader's Digest Children's Atlas of the Universe.* Pleasantville, NY: Reader's Digest Books for Children.
ISBN: 15758437-0
Encyclopedia resource that could be used to look up facts, maps, and diagrams about astronomy. The atlas is divided into several sections where students can find information on the Earth, history of astronomy, Earth's neighbors in space and many other astronomy concepts.
4-3.1, 4-3.2, 4-3.3, 4-3.4, 4-3.4, 4-3.5, 4-3.6, 4.3.7, 4-3.8

Couper, H. (1999). *DK Space Encyclopedia.* New York: DK Publishing
ISBN: 0789447088
A guide to astronomy and space travel will help students understand work done by scientist. Detailed images plus instructions for building a simple telescope are included.
4-3.1, 4-3.2, 4-3.3, 4-3.4, 4-3.4, 4-3.5, 4-3.6, 4.3.7, 4-3.8

Editors of TIME for Kids. (2005). *Planets! Discover our Solar System!* New York: Harper Collins Publishers.
ISBN: 006078203X
Facts and information presented to heighten students' interest in planets. Includes information on telescopes and how they are used. Includes wonderful drawings and photos.
4-3.1, 4-3.8

Fedfern, M. (1998). *The Kingfisher Young People's Book of Space.* New York: Houghton Mifflin.
ISBN: 0-7534-5136-0
This book takes us on a journey through space starting with an up-to-date report of observations and explorations of our solar system. Outstanding pictures accompany the text.
4-3.1, 4-3.2, 4-3.3, 4-3.4, 4-3.4, 4-3.5, 4-3.6, 4.3.7, 4-3.8

Gibbons, G. (1998). *The Moon Book.* New York: Holiday House, Inc.
ISBN: 0823413640
Lexile Level: 740L
Identifies the moon as Earth's only natural satellite, describes its movement and phases and how we have observed and explored it over the years.
4-3.2, 4-3.6

Gibbons, G. (2005). *Planets.* New York: Holiday House, Inc.
ISBN: 0823419584
This book discusses the movements, location, and characteristics of the planets in our solar system.
4-3.1, 4-3.5

Kerrod, R. (2000). *The Sun.* Minneapolis, MN: Lerner Publications Co.
ISBN: 0822539012
The book discusses the Sun and how to observe it. The use of space telescopes is also discussed showing how data on wavelengths of light can collected.
4-3.1, 4-3.2, 4-3.3, 4-3.4

Simon, S. (2003). *The Moon.* New York: Simon and Schuster.
ISBN: 0-689-83563-9
Lexile Level: 730L
This book on lunar structure and exploration tells about Earth's closest neighbor, the Moon. The book starts with the exploration of the Apollo astronauts. This book would be a great source for an introductory lesson on the Moon.
4-3.2, 4-3.6

Sipiera, P. (1997). *The Solar System.* New York: Children's Press.
ISBN: 0-516-20330-4
This book provides a description of our solar system and all the planets that are a part of it.
4-3.1

## Suggested Streamline Video

**A Closer Look at the Planet:  Space Science Series**
ETV Streamline
After watching this video, students will understand that the solar system is comprised of the nine planets, their moons and other objects in the sky and that scientists divide the planets into two categories – outer planet and inner planets. They then discover important facts that distinguish each planet. And finally we learn how science and technology has helped us discover more about the planets and our solar system.
20:00
4-3.1

**Our Home in Space**
ETV Streamline
Learn about the importance of the sun, some characteristics of the Earth, what causes day and night and the change of seasons, and how the moon moves.  Lastly see the importance of telescopes in revealing the mysteries of our solar system
15:00
4-3.3, 4-3.4, 4-3.6, 4-3.8

A Closer Look at the Moon:  Space Science Series
ETV Streamline
This inspiring look at the Moon helps students understand what makes Earth's nearest neighbor so unique. Understand the phases of the Moon and learn what a waxing or waning moon is.
20:00
4-3.2, 4-3.6

Junior Space Scientist:  Our Solar System
ETV Streamline
Introduces the planets of our solar system through video taken in space, animation, and demonstrations. Information about the planets is shared by comparing characteristics and examining differences as well as similarities. Terms, such as gravity, orbit, rotation, stars, and density, are presented. Students should develop an interest in and a questioning mindset about our solar system. Produced for United Learning by the Duncan Group.
9:33
4-3.1

The Magic School Bus Gets Lost In Space
ETV Streamline
Arnold's know-it-all cousin Janet drives the kids crazy when she joins Ms. Frizzle's class on a field trip and gets them lost in outer space!
29:08
4-3.1

Seasons of the Year
ETV Streamline
The four seasons of the year, fall, winter, spring and summer are all determined by our planet's changing position in relation to the sun. While the Earth orbits the sun, it spins on its own axis. An axis is an imaginary pole that runs through the center of Earth. The Earth's axis is not straight up and down, but tilted. This tilt in combination with Earth's motion around the sun causes the change of the seasons.
2:00
4-3.4

Science Facts and Fun: What's In a Shadow?
ETV Streamline
The shadow in relation to the sun's position is explained, and how knowledge of the sun's position helps in finding directions is shown. The earth's rotation and the earth-sun relationship are illustrated to explain the rising and setting of the sun.
15:00
4-3.3.4, 4-3.5, 4-3.7

TLC Elementary School: Exploring Stars
Optical Telescopes
ETV Streamline
Shows the changes telescopes have undergone from early models to the Hubble Space Telescope, and introduces Galileo, the first person to point a telescope towards the sky.
3:22
4-3.8

The Solar System: A First Look
ETV Streamline
Visit each of the nine planets to learn about their special features, sizes, and orbits. Learn about the planets' moons and rings, and how gravity keeps them in orbit. Stop at the sun, discover its immense size, and see sunspots and solar flares. Find out what scientists have learned about the planets through telescopes, space missions, and satellites.
15:00
4-3.1, 4-3.3

Stage One Science: changing Seasons
ETV Streamline
By plotting shadow lengths and angles, students investigate daily and seasonal changes. A simple explanation of how the Earth moves around the sun is demonstrated, and viewers learn that patterns in weather are related to seasonal change.
15:00
4-3.4, 4-3.7

## Career Connections

**Astronomer**
Astronomers use principles of mathematics and physics to study the universe, including moon, planets, sun, stars, and galaxies. They also apply their knowledge to solve problems in navigation, space flight, and satellite communications. Astronomers conduct scientific research and write scientific papers on their findings. (ES-4.3)

**Astronaut**
There are two types of astronauts recruited by NASA – pilot astronauts who fly the spacecraft and mission specialist astronauts who take care of the spacecraft and all the equipment on board. Astronauts conduct experiments and go outside the spacecraft when necessary. Astronauts should have a college degree in mathematics, engineering, or physical or biological science. If selected as an astronaut candidate you must go through a year of training. (ES-4.3)

**Spacecraft Engineer**
Spacecraft engineers work with a team of engineers to maintain the health and safety of spacecraft. While spacecraft engineers work on the ground they are still responsible for spacecraft maintenance while in space. To enter this career you should have a background in engineering (preferably aerospace) with mathematics and computer programming. (ES-4.3)

**Planetarium Director**
The planetarium director is the person who runs a planetarium. The director plans show for visitors and is in charge of all people who work in the planetarium. Planetarium directors should have a strong background in astronomy. (ES-4.3)

**Astrogeologist**
An astrogeologist studies the origin, history, composition, and structure of planets and other celestial bodies. They use knowledge of chemistry, physics, math, biology, and astronomy to analyze data and specimens. Much of their work is done on computers that are located in an office setting. (ES-4.3)